TEACHER-TRAINEES' BACKGROUND IN TEACHING AND LEARNING OF MATHEMATICS

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Abstract

This study investigated teacher trainees' preference for enrolling in the college of education programmes and their conceptual understanding of mathematics. The study employed the quantitative research approach where purposive and convenience sampling techniques were adopted to select 641 third-year teacher-trainees of the 2019/2020 batch from three colleges of education in the Volta Region. The instrument for data collection was developed and structured from reviewed literature and analyzed using descriptive statistics. The 21-survey items were administered to 842 participants at Akatsi, Peki, and St. Francis Colleges of Education. At the Junior High School and Senior High School levels, teacher-trainees below the age of 25 years performed better in mathematics than those above 25 years and only 20.3% and 24.6% studied Sciences at the SHS and the College of Education respectively. As low as 34.9% did not want to become teachers, nevertheless, 72.9% desired to teach mathematics after graduation. The study would enable the Colleges of Education to meet the goal of mathematics learning as stipulated in the National Curriculum Framework of 2005 (the 'mathematization' of the child's thinking). On average, teacher trainees have relatively good knowledge and interest in the teaching and learning of mathematics. They should, therefore, be guided in introducing them to effective instructional strategies with special reference to constructivism.

Keywords: Mathematics Conceptualization, Teacher-Trainees, Constructivism.

Introduction

Quality teacher education is a priority with the responsibility that teacher performance is of the highest interest towards achieving excellent educational agenda (Asare & Nti, 2014). In the school setting, the aims and objectives of education can be achieved through taught subjects including mathematics (Egbochuku & Alika, 2008). So, one of the primary goals of education is to make students reach high competence in mathematics (Tall & Razali, 1993). Taking this into consideration, it suffices to note that among the multiple problems of education, the teachers are the ultimate definer of academic achievement (Adegoke, 2003) and that there is a no more powerful influence on students' success than the teacher (Stronge, 2010). Accordingly, teacher-trainees must be supported to explore all available means to ensure that they have the grips of mathematics concepts for success. Knowledge of mathematics, especially at basic and secondary school levels is seen as an issue, particularly within the mathematics community (Ball, 1990) by policymakers, educators, and students (Alexander, Rose, & Woodhead, 1992). Similarly in Ghana, poor performance in mathematics at the basic and secondary levels has attracted a lot of attention from the government, mathematics educators, educational researchers, curriculum designers, parents, and employers. This is evident in how teaching and learning of the subject take place at all levels including tertiary institutions, for example, the colleges of education whose graduates teach at the basic level (Fredua-Kwarteng, 2005; Appiah, 2010). Akinoso (2011) states that mathematics is the foundation for science and technology hence a tool for building industrial economies. This means that mathematics learning must not be taken for granted if a nation is to develop economically. Therefore, mathematics though of magnitude and numbers is very useful in all subject areas which include science, engineering, technology, and the humanities from which industrial development takes off (Anigbo, 2016).

Despite serious attention being paid to the study of the subject by all stakeholders in Ghana and elsewhere, students still do not perform well in mathematics examinations, rendering some of them not able to proceed to the next level of education (Sarfo, Eshun, Elen & Adentwi, 2014). This point is buttressed by the fact that over the past five years ending the 2017/2018 academic year nationwide, 72.6% and 30.1 % of BECE and WASSCE candidates passed mathematics with grades 1-6 respectively (WAEC, 2019). In the Volta Region where the sample of this study was taken, the average pass grades of 1-6 for BECE and WASSCE candidates in mathematics for the past five years ending the 2017/2018 academic year, is 61.0% and 21.6% respectively which were lower than the national averages of 72.6% and 30.1% for WASSCE and BECE respectively (WAEC, 2019). The WASSCE results in mathematics of the participants for which they were admitted into the colleges of education indicated that on average, 50% obtained grade D, 36% obtained grade C, 9% obtained grade B whilst 5% obtained grade A.

The low intake in STEM programmes in universities and colleges of education is mostly due to poor performance in mathematics and sciences at the basic and senior secondary school levels (Shearman, 2012). In the 2007/2008 academic year, only 32% and 38% of students enrolled in STEM disciplines at public and technical universities respectively instead of the 60% target from the Ministry of Education (ESP Report, 2010). In the 2012/2013 and 2017/2018 academic years, 36% (NAB, Tertiary Education Statistics, 2015) and 40% (ESP, 2019) of tertiary students enrolled in STEM programmes respectively. And combining the three sample colleges of education, only 24.6% offered science/mathematics and technical programmes. Fundamentally, STEM education and learning opportunities are enhanced by strong mathematics background (Alfieri, Higashi, Shoop, & Schunn, 2015; Hefty, 2015; Magiera, 2013; Smith et al., 2013) and the strength of a nation's Science, Technology and Innovation (STI) hinges on the quality of teachers in mathematics and science for first and second cycle schools (MESTI, 2017). The demand for scientists and engineers are rising, yet countries are faced with discouraging statistics in the number of students pursuing STEM programmes, because of the disappointing mathematics and science scores that place students' performance below many industrialized nations (Mohammed, 2015). These statements are very illuminating because they capture the fundamental point that a strong mathematics interest is a prerequisite to building an industrial culture in any nation (Ahia & Fredua-Kwateng, 2004). As a result of the low intake in STEM programmes, Ghana recorded low technological and engineering industries and organizations (Ghana Statistical Service, 2013).

Consequently, the factors that contribute to the fearful nature of the subject may include teachers' attitudes, content knowledge, and pedagogical skills, students' negative perceptions due to lack of interest, the government's inability to create the necessary learning environment, and so on. Students are averse to mathematics because of the normal ways of teaching where teachers insist on using certain rigid skills which discourage them from trying to invent new ways to do those things (Minsky, 2008). Rivera-Batiz & Marti (1995) conducted a multiple regression analysis and concluded that a high student population in a class also affects academic performance negatively, hence poor performance in mathematics. Other widely given explanations as to why students do not learn mathematics include the inadequacy of teachers' mathematics content knowledge and the lack of rigorous certification that is required with insufficient pedagogical competencies (Hare, 1999. So, teachers are always using less challenging problems to save teaching time and to prevent students from the possibility of becoming demotivated in learning mathematics (Ismail et al., 2014).

Constructivism

According to Mok and Morris (2001), western culture has some level of influence on the teaching and learning of mathematics which is based on educational reforms, hypothesized with experience and construction of ideas through practices. For example, a teacher who wants his pupils to learn about triangles has his own thought about triangles. It is therefore not difficult for the teacher to dwell on an

ontological state of mind, acting as if there is an object referred to as a triangle and expecting his learners to know about it. Where the learners do not show a similar understanding of the triangle, the teacher concludes that the teaching process has failed. Secondly, the context in which the statement is made is critical to its validity as to whether the learner understands what a triangle is all about. This view may seem compounded to the teacher as the learner brings new or different knowledge that does not match the teacher. If this happens, then the teacher settles on the idea that the learner does not fit into his class or fit into his knowledge construction.

In constructivism, knowledge acquisition is through personal construct such that one's inner practicality is dependent on personal experiences based on prior knowledge which comes through interactions with people, personal ideas, and adaptations to differences in the perceived environment. Through this, students learn through challenges to construct their own ideas because they remember what is being taught through their active involvement in the learning process leading them to connect mathematical concepts. Thus, students are capable of inventing their own concepts and ideas and linking same to what they already know. This personal "meaning-making" theory of learning is called constructivism. In other words, when learners do not make their own mental constructs they consequently make conceptual errors or have misconceptions, or are not able to interpret the material being studied. Constructivism, therefore, is a philosophical viewing platform of learning where new knowledge is acquired when learners construct and connect mathematical concepts from their own ideas and understanding in an acceptable environment (Cakir, 2008).

To the Ministry of education and the Ghana Education Service, graduates from the colleges of education are posted to the basic schools to teach all subjects including mathematics, so teachers must be adequately equipped to enhance pupils' performance. However, teacher-centered pedagogy is dominant in the colleges of education where teacher-trainees are regarded as "empty vessels" (tabula rasa) with little or no knowledge or experience in the teaching and learning process (Lewin & Stuart, 2003). Scanning through the mathematics syllabuses of basic and secondary schools, the constructivist theory has been explicitly prescribed to be used by mathematics teachers with the concept of scaffolding, inclusion, and differentiated teaching models (Ministry of Education, 2007 & 2019). Also, the teaching strategies of mathematics in the colleges of education give priority to student-centered, problem-solving, decision-making, critical and reflective thinking, and mentoring approaches as well as an emphasis on practical and tutorial sessions (Colleges of Education Mathematics Curriculum, 2014) such that these approaches point to constructivism. These teaching strategies according to the curriculum are to establish a judicious balance between theoretical knowledge and teaching skills, to train pre-service teachers to be facilitators of learning, and produce creative researchers in the classroom. However, at a training session for teachers in the Volta region, where the researcher was the resource person, it was observed that teachers do not have sufficient knowledge about the concept of constructivism during one of the presentations. In order to have empirical evidence, a survey was conducted for these teachers at another training session where it was gathered that out of a total of 138 teachers; only 35 teachers responded that they understand the term, constructivism. However, 75.3% of the 35 participants could not explain the term. This means that teachers at basic schools may not consciously be using the constructivism principle to teach mathematics or other subjects. Following this fact, the researcher decided to extrapolate this information to the colleges of education to find out whether or not constructivism is practiced as a teaching and learning model.

Policy Interventions

The theory of constructivism is generally believed to have contributed to the teaching and learning of mathematics to the effect that most of the mathematics curricula in the USA and the United Kingdom and other developed countries are based on the principles of constructivism (Jaworski, 1991, 1994). These reforms are aimed at preparing young students in the current generation to face the globalized

economy in a knowledge-based society with an information-rich curriculum to understand mathematical concepts (Wong, Han & Lee, 2004). In all these, policymakers, mathematics educators, and researchers have concluded that mathematics curriculum reforms are centered on the aims, pedagogy, and assessment strategies, based on theoretical principles, such as constructivism (Eggleton, 1995; Frykholm, 1995; Gregg, 1995; Knapp, & Peterson, 1995; Watson, 1995 Fan, 2003; Zheng, 2004, Chen, 2010).

The foundation of every educational structure stems from the basic schools whose teachers are mostly from the colleges of education. The implication, therefore, is that if the content knowledge and pedagogical skills of teacher-trainees are not strong then there will be numerous problems associated with the academic performance of the pupils in mathematics. In this regard, a section of the Ghana-Vision 2020 policy document (NDPC, 1996), the main goal of mathematics learning as stipulated in the National Curriculum Framework of 2005 (the 'mathematization' of the child's thinking) and the Sustainable Development Goal 4 (SDG4) document (UNGA, 2015) are designed to upgrade the quality of teacher-trainees to ensure equitable quality education in order to promote life-long learning opportunities for a substantial increase in the supply of quality teachers. Furthermore, the Teacher Training Colleges are upgraded to Colleges of Education (tertiary) to improve the quality of teacher-trainees (Colleges of Education Act, 2012, Act 847) (T-TEL, 2016).

Research Questions

1. Which regions do teacher-trainees come from and attend high schools?
2. What programmes do teacher-trainees offer in senior high schools and colleges of education?
3. What is the performance of teacher-trainees in mathematics vis-à-vis their admission status to colleges of education?
4. How significant is the teaching profession and teaching of mathematics to teacher-trainees?
5. How knowledgeable are teacher-trainees in constructivism as an instructional model?

Justification

Education is the means to the political, social, and economic growth of a nation (Olawoye & Salman, 2008) and mathematics is the queen of science and technology and the bedrock of national development (Alutu & Eraikhuemen, 2004). Therefore, in building an industrial economy, there is a need for a strong mathematics culture (Akinoso, 2011) as seen in Fig. 1, developed by Ashiboe-Mensah from literature. Justifiably, the Chief Examiners of WAEC said mathematics teachers must use effective instructional strategies, preferably constructivism to teach mathematics in our schools (WAEC, 2014).

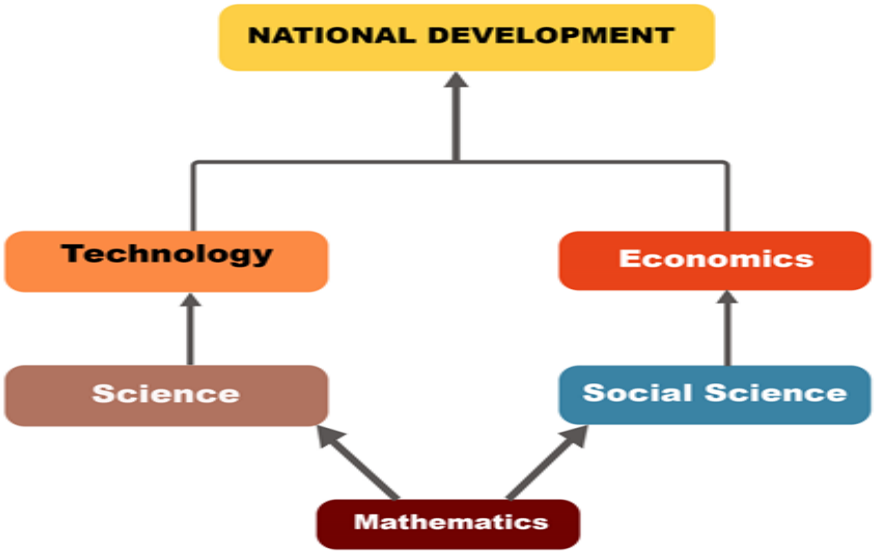

Fig 1: National Development Model

Significance

The findings of the study are to enable the Ministry of Education to design new educational policies for the teaching and learning of mathematics which seeks to achieve Sustainable Development Goal 4 in order to ensure equitable quality education for the promotion of life-long learning opportunities to substantially increase the supply of quality teachers by 2030. Also, the objects of the Colleges of Education Act, 2012, Act 847 speaks to the upgrading of teacher education to meet the current educational dispensation. The Ministry of Environment, Science, Technology, and Innovation (MESTI) should formulate policies to support and increase the enrolment levels in STEM programmes in tertiary institutions such that industry players will establish more STEM industries and organizations in Ghana.

Methodology

Twenty-one (21) open-ended item questionnaire was constructed from literature to collect data from 641 teacher-trainees in the Volta Region to discover their mathematical experiences and the meaning they give to the teaching and learning of the subject. At the end of the 2018/2019 academic year, there were 55,189 teacher trainees in the 48 public and private colleges of education in Ghana (NCTE, 2019). There are seven (7) public colleges of education in the Volta Region with a total population of 6,638 and one private college for the 2019/2020 academic year, admitted on the basis of their performance (credit pass) in six subjects including core mathematics at the West African Senior School Certificate Examinations (WASSCE).

The available population consists of Akatsi College of Education which had a total of 1,263 teacher-trainees, contributing 38.1%, Peki College of Education which had 874 teacher-trainees contributing 26.4% whilst St. Francis College of Education which also had 1,174 teacher-trainees, contributing 35.5% for the 2019/2020 academic year. This figure of 3,311 which was drawn from the three colleges was made up of 1,134 (34.2%) females and 2,117 (65.8%) males (Table A1).

Table A1: Available Population

College of Education	Female		Male		Total	
	N	%	N	%	N	%
Akatsi	396	31.4	867	68.6	1263	38.1
Peki	367	42.0	507	58.0	874	26.4
St. Francis	371	31.6	803	68.4	1174	35.5
Total	**1,134**	**34.2**	**2,177**	**65.8**	**3,311**	**100.0**

Source: NCTE, 2019

Consequently, a purposeful sample size of 1,064 consisting of third-year teachers-trainees in the three colleges of education as indicated in Table A2 with female numbers of 392 constituting 36.8% and their male counterpart 672 constituting 63.2% was selected. This sample was considered in the study because the participants studied mathematics in their first and second years in the colleges, therefore had an adequate amount of knowledge on the teaching and learning of mathematics. These were the last batch of teacher-trainees offering the diploma programme in the colleges of education and were ready to respond to the items in the questionnaire.

Table A2: Purposeful Sample

Colleges of Education	2018/2019 Purposeful Sampling					
	Female		Male		TOTAL	
	N	%	N	%	N	%
Akatsi	164	42.7	222	57.8	384	36.1
Peki	112	39.4	172	60.6	284	26.7
St. Francis	116	29.4	278	70.6	394	37.0
Total	**392**	**36.8**	**672**	**63.2**	**1,064**	**100.0**

Source: Sampled Colleges of Education

A total of 842 teacher-trainees of the 2019/2020 academic year were present in the halls of the respective colleges of education at the time of administering the questionnaire. The female and male participants' contributions to the convenient sample of 641 were 238 (37.1%) and 403 (62.9%) teacher-trainees respectively. In this sample, Akatsi College of Education contributed 216 (33.7%) participants, Peki College of Education contributed 179 (27.9%) participants and St. Francis College of Education contributed 246 (38.4%) participants (Table A3).

Table A3: Convenient Sample

Colleges of Education	2018/2019 Convenient Sampling					
	Female		Male		Total	
	N	%	N	%	N	%
Akatsi	76	35.2	140	64.8	216	33.7
Peki	82	45.8	97	54.2	179	27.9
St. Francis	80	32.5	166	67.5	246	38.4
Total	**238**	**37.1**	**403**	**62.9**	**641**	**100.0**

Source: Sampled Colleges of Education

On the whole 641 respondents returned the questionnaire out of 842 who were present in the halls at the time of administering the questionnaire with an average response rate of 76.1% as shown in Table A4 below.

Table A4: Response Rate

Colleges of Education	Available Sample (N)	Administered Questionnaire (N)	Questionnaire Returned (N)	Response Rate (%)
Akatsi	384	301	216	71.8
Peki	284	219	179	81.7
St. Francis	394	322	246	76.4
Total	**1,064**	**842**	**641**	**76.1**

With a convenience sampling technique, primary data was collected from the study sample through the use of a self-administered questionnaire which was based on the research topic. In each of the colleges, a period was dedicated for the teacher-trainees to respond to the items.

Analysis and Results

The female and male participants' contributions to the convenient sample of 641 were 238 (37.1%) and 403 (62.9%) teacher-trainees respectively. Four hundred and twenty-six (426) teacher-trainees were under 25 years old and constituted 67.1% and two hundred and eleven (211) were 25 years old and above also constituted 32.9% of the sample (Appendix 2a). On the issue of performance in mathematics, 80.8% of respondents under 25years old had credit passes whilst 72.2% of the respondents who were 25 years old and above had credit passes (Appendix 2b). It is evident from the literature that more young students who enter colleges turn to outperform the older ones (Matta, Ribas, & Sampalo, 2016; (Owolabi & Etukiren, 2014).

The majority (87.2%) of the respondents hailed from District Assemblies in the Volta Region and 10.1% came from five (5) other regions which include Greater Accra, Ashanti, Eastern, Central, and Brong-Ahafo. Results show that most of the respondents (78.8%) and (84.7%) went to junior and senior high schools respectively in the Volta Region. The effect is that majority of the teacher-trainees in the colleges under study came from and went to basic and secondary schools in the Volta Region (Appendix 3). This result justified the fact that students from the region actually performed poorly in mathematics with pass rates of 60.1% and 21.6% for the basic and secondary levels in that order as compared to the national average pass of 72.6 % for BECE and 30.1 % for WASSCE (WAEC, 2019).

One most important criteria for offering Sciences (General Science, Technical, andAgriculture programs) at the SHS level is a good understanding of mathematical concepts (Akinoso, 2011). Studies have confirmed that students who read sciences have a more positive attitude and understanding toward higher performance in mathematics than those in the humanities (Karjanto, 2017). The research, therefore, shows that 20.3% of the respondents studied Sciences at the SHS level with 44.8% and 27.3% studying Arts and Business programmes respectively, and as low as 7.1% read Home Economics and Visual Arts (Appendix 4a). In the colleges of education, as low as 24.6% of teacher-trainees offered science, maths, and technical programmes (Appendix 4b).

Responses from the participants indicated that only 13.5% of participants had direct admissions to the colleges of education for the 2017/2018 academic year. This means that the rest of the respondents stayed in the house for some number of years before getting admission to the colleges. In a particular case, as much as 78.6% of the respondents spent between one and four years at home before getting admission to the colleges (Appendix 5). The reasons adduced to this trend include failures in all core subjects including mathematics (15.9%), elective subjects including mathematics (26.1%), and Core Mathematics only (3.9%) which could be a determinant of participants' previous knowledge in mathematics and their readiness to become professional mathematics teachers (Appendix 6).

Mathematics as a core subject is offered at both the basic and secondary levels. In this study, 66.0% and 38.2 % of the respondents passed the subject with grades 1-3 at the BECE and WASSCE turn

(Appendix 7). These figures confirmed the research conducted by Wijsman, Warrens, and Westenberg, (2015) that students at higher secondary education do not have the privilege of being motivated by knowledgeable adults to learn and perform well at school as in lower secondary education. The average passes in mathematics courses of the first and second years at the college of education were 28.5% and 32.6% respectively for grade A, where grade A is the best. as shown in Appendices 8a and 8b.

Teaching mathematics at the primary level is not a choice for college of education graduates who are classroom teachers at the primary level according to the Ghana Education Service, though most graduates from the colleges are mathematics phobia mainly due to how they were taught and their personal attitude towards the subject. However, in responding to the question about participants' interest in mathematics, a total of 467 (72.9%) were interested in teaching mathematics while 159 (24.8%) of the respondents did not want to teach the subject (Appendix 9). This is a confirmation of research conducted (Norton, 2017) on primary school teachers' confidence in their mathematical content knowledge and confidence to teach primary mathematics. In response to the reasons adduced for teaching the subject, 31.6% stated that the subject promotes personal development and critical thinking skills, 20.6% said they want to help the pupils to have an in-depth mathematical conceptualization, 41.1% indicated their love and passion for and interest in the subject, and 3.2% said it was due to the motivation received from their teachers and parents (Ahia & Fredua-Kwateng, 2004) as indicated in Appendix 10. Out of the 174 (27.1%) of the sample who would not like to teach mathematics, 24.7% said the subject is too difficult to understand (Ernest, 1991), 19.5% indicated that they did not have a good mathematical foundation, 26.4% specified that they just don't like the subject and 16.2% had other reasons which include inadequate teaching and learning resources (Azmidar et al., 2017) as in shown Appendix 11.

As the desire for the teaching profession is one of the factors that change the educational landscape (Adegoke, 2003), the research sought to find out about the first choice of respondents' profession. In line with this, only 224 (34.9%) of the respondents said teaching was their first choice of profession whilst the remaining 65.1% mentioned other professions such as Medicine (21.9%), Accounting (10.3%), Engineering and Security (16.2%) and other professions (14.2%) as shown in Table 12. Research has it that negative dispositions to teaching stem from teachers' personal experiences and attitudes when they were in school with a growth cycle of adverse perceptions that is strengthened throughout their school life (Ball, 1990; Mayers, 1994). The implication is that most of these teacher-trainees may be using the teaching profession as a stepping board to venture into their preferred professions as they all claim the profession is not lucrative. Consequently, these teachers may be in the classroom without their hearts and minds which affects the teaching and learning process, hence contributing to the poor achievement rate of students. Nonetheless, a teacher with strong disciplined knowledge and a sound disposition toward teaching is the most important variable affecting student performance (Hattie, 2009). Investigating the reasons behind the choices of the 224 respondents who would like to be teachers by profession, 51.8% said they wish to impart academic and professional knowledge to the next generation, 30.4% said it is an act of love and passion for the profession, whilst 8.5% said they are into the teaching profession because of the motivation they received from their teachers and parents (Appendix 13). These reasons are sufficient for the good desire for the teaching profession as indicated in Balyer and Ozcan (2014), Kyriacou and Coulthard (2000), Thomson, Turner and Nietfeld (2012), Yuce et al., (2013) which is cited in Lundstrom, Manderstedt and Palo (2018).

For clarity and especially for those whose first choice of profession was not teaching and yet desired to become professional teachers, the researcher was interested in knowing why they were in the colleges of education. Their responses were shown in Appendix 14 were three hundred and twenty-eight (328) respondents forming 51.2% mentioned that they love and have an interest in the teaching profession even though their interest was not to become professional teachers, 14.7% said they were influenced by

their mentors such as teachers and parents, and 18.7% indicated that it was due to financial constraints. It must be put on record that the governments at a point in time gave teacher-trainees allowances to motivate and cushion them in their preparation for the teaching profession. This intervention may be best suited for those whose reason has to do with financial constraints.

One of the main purposes of this research was to investigate if teacher-trainees are knowledgeable in constructivism as a teaching and learning model. This step was taken because constructivism is viewed as one of the most powerful teaching and learning models for mathematics conceptualization (Jaworski, 1991, 1994). In all, a total of 303 respondents representing 47.3% of the study sample claimed they understood what was meant by constructivism. However, only 99 (32.7%) out of 303 respondents could explain constructivism correctly with the remaining 204 (67.3%) getting the understanding wrong. It was therefore indicative from the table that more than half of the respondents (338), which form 52.7% of the 641 respondents have no idea about constructivism as a teaching and learning model (Appendix 15) at the initial stage. However, 204 participants out of the 303 could not explain the term 'constructivism', indicating that a total of 542 (84.6%) participants have no idea about constructivism. This result is in line with the survey conducted for teachers at a training session by the researcher which gathered that 81.2% out of 138 teachers did not understand the term, constructivism. These responses are not consistent with research conducted by Ramsook and Thomas (2016) in Trinidad and Tobago where 96.2% of teacher-trainees revealed that they understand the principles of constructivism which subsequently influenced their personal philosophy of teaching and learning.

Conclusion

There are more males than females in the colleges of education such that the majority of them are below 25years. This age bracket outperformed those who are 25 years and above in mathematics with the majority going to basic and secondary schools in the Volta Region. As low numbers of teacher-trainees offered science courses, fewer students studied STEM programmes in the colleges of education. The trainees' performance in mathematics at the basic level is higher than that at the secondary level. This result justified the fact that students from the Volta Region performed poorly in mathematics with average pass rates of 60.1% and 21.6% for the basic and secondary levels in that order as compared to the national average pass rates. The greater proportion of the teacher-trainees did not get direct admission into the colleges of education as passing in mathematics has been the major reason why they stayed behind to improve their performance. From the analysis, teacher-trainees do not have disciplined knowledge and sound disposition toward teaching because the majority of them did not choose teaching as their first choice profession. Even though teacher-trainees did not want to become teachers according to the responses, they are motivated to become professional teachers due to immediate job acquisition and influences from society. It must be put on record that the governments at a point in time gave teacher-trainees allowances to motivate and cushion them to adequately prepare for the teaching profession. This intervention is best suited for those whose reason has to do with financial constraints. From the analysis, it is clear that most of our teachers went into teaching to use it as a springboard and venture into other jobs. The indication is that they do not have a passion for teaching hence poor delivery tendencies which affect students' learning process. With varying reasons of interest in mathematics, however, 72.9% of the respondents desired to teach mathematics after graduation. The number of teacher-trainees who understood constructivism is less than those who don't understand.

Recommendations

If the objective of helping pupils is to understand mathematical concepts using constructivism as spelt out in the Ghanaian mathematics curriculum, and based on the results of this study, measures must be put in place to help teacher-trainees to develop a conceptual understanding of mathematics using

constructivism. Department of Mathematics in the colleges must institute measures to ensure that teacher-trainees are introduced to using effective instructional strategies such as constructivism in their learning process. This will enable the teacher-trainees to be effective in mathematics teaching and learning as they are encouraged to improve their mathematical concepts and receive training on how to teach the subject. Fewer numbers of teacher-trainees offered science courses, so teacher-trainees must be encouraged to offer science courses at the basic and secondary levels as teachers improve on their teaching methods. Teacher-trainees should be guided to recognize and question the assertions that are made with inappropriate instructional strategies during mathematical lessons. From the foregoing, systems must be put in place to retrain teacher-trainees who have positive attitudes towards mathematics. The Ministry of Education and the Ghana Education Service must take a closer look at the teaching profession and design policies that will improve teachers' conditions of service in order to encourage prospective teachers. Finally, teacher-trainees must be supported to explore all available means to ensure that they have the grips of mathematics concepts for success. The Ministry of Environment, Science, Technology and Innovation (MESTI) should liaise with MoE, GES and GTEC to improve the country's STEM education drive. These statements are very illuminating, because Ahia and Fredua-Kwateng (2004) capture the fundamental point that a strong mathematics interest is a prerequisite to building an industrial economy of a nation.

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